

Section 26 — The FUNt Universal Wavelength Law (UWL λ)

Section 26 defines the FUNt Universal Wavelength Law (UWL λ), the spatial dual to the Universal Frequency Law (UFL). UWL λ establishes that wavelength is not a separate property from frequency, but the spatial projection of φ -curvature traversal under the FUNt oscillation structure. Under FUNt, wavelength emerges from breathing-radius geometry, torsion, harmonic stiffness, and the Wave-Web Resonance (WWR) field.

26.1 Core Definition of UWL λ

- Wavelength λ is the spatial footprint of φ -driven oscillation.
- λ arises from curvature, not speed.
- Lower φ -curvature $\rightarrow$ longer wavelength.
- Higher φ -curvature $\rightarrow$ shorter wavelength.

26.2 Formal Mathematical Expression of UWL λ

UWL λ is expressed as:

$$\lambda = K_{\lambda} \times (\Delta S / \Delta \varphi) \times \sqrt{\Delta H}$$

Where:

- K_{λ} = wavelength coupling constant
- ΔS = spatial breathing distance per cycle
- $\Delta \varphi$ = harmonic curvature per cycle
- ΔH = harmonic stiffness (torsion–buoyancy anchor)

26.3 Spatial Curvature as Wavelength Driver

- Long wavelengths correspond to low curvature in φ^4 – φ^5 bands.
- Atomic wavelengths map to φ^6 – φ^7 curvature spacing.
- EM wavelengths arise from torsion–breathing interaction in field-lattice.
- Scalar wavelengths exist only as $\varphi^9 \rightarrow \varphi^6$ reentry projections.

26.4 λ –f Harmonic Duality

- In classical physics, $\lambda = v/f$. Under FUNt, v is curvature-projected lattice stiffness.
- UFL + UWL λ combine into a geometry: $\lambda \times f = \varphi$ -driven traversal invariant.
- Frequency describes temporal traversal; wavelength describes spatial traversal.
- The product λf is a projection of φ -curvature consistency.

26.5 Quantum Wavelengths Under FUNt

- De Broglie wavelength emerges from φ^6 – φ^7 curvature shifts.
- Photon wavelengths correspond to harmonic torsion modes of field-lattice.
- Collapse events shorten λ abruptly as $\Delta\varphi$ increases.
- Neutrino wavelengths trace $\varphi^7 \rightarrow \varphi^8$ curvature compression.

26.6 Classical and Electromagnetic Wavelengths

- Radio waves correspond to low φ -curvature (φ^4 region).
- Optical spectrum arises from φ^6 – φ^7 curvature windows.
- X-rays and gamma rays correspond to φ^8 – φ^9 spike curvature.
- Mechanical waves map to breathing radials of molecular bonding lattices.

26.7 Scalar Wavelengths and ϕ^9 Collapse

- Near φ^9 , $\lambda \rightarrow 0$ as $\Delta H \rightarrow 0$ and curvature spikes.
- This produces tunneling, instantaneous transitions, and reentry bursts.
- Scalar collapse wavelengths cannot persist; they remap to φ^6 – φ^7 .

26.8 Applications of UWL λ

- Explains full EM spectrum ordering without c-based assumptions.
- Defines biological and neural wavelength behavior.
- Predicts astrophysical jets and collapse signatures.
- Unifies classical, quantum, and scalar spatial modes.